

CLAIMS

What is claimed is:

1. A fuel cell stack (10) for generating electrical current, comprising:

- 5 a. a plurality of thin fuel cells (46, 48, 50, 52, 54), wherein each thin fuel cell (46) includes a water management water transport plate (60) that defines water management channels (62A, 62B, 62C, 62D) for directing flow of water from and through the thin fuel cell (46);
- 10 b. a plurality of thick fuel cells (56, 58) cooperatively disposed with the thin fuel cells (46, 48, 50, 52, 54) to form the fuel cell stack (10), wherein each thick fuel cell (58) includes a combined water management and
15 coolant water transport plate (74) that defines cooling channels (76A, 76B, 76C, 76D) for directing flow of water from and through the thick fuel cell (58); and,
- 20 c. wherein the thick fuel cells (56, 58) are secured within the fuel cell stack (10) so that at least two thin fuel cells (48, 50, 52, 54) are secured adjacent each other and adjacent each thick fuel cell (56, 58), and wherein the water management channels (62A, 62B, 62C, 62D) have a depth parallel to a longitudinal axis of
25 the stack extending a shortest distance between non-adjacent fuel cells (46, 48) of the stack (10) that is at least four times less than a depth of the cooling channels (76A, 76B, 76C, 76D).

2. The fuel cell stack (10) of claim 1, wherein between two and five thin fuel cells (46, 48, 50, 52, 54)

are secured adjacent each other and adjacent each thick fuel cell (56, 58).

3. The fuel cell stack (10) of claim 1, wherein the water management channels (62A, 62B, 62C, 62D) of the water management water transport plates (60) of the thin fuel cells (46, 48, 50, 52, 54) have a
5 depth of between about 0.10 millimeters and about 0.25 millimeters, and the cooling channels (76A, 76B, 76C, 76D) of the combined water management and coolant water transport plates (74) of the thick
10 fuel cells (56, 58) have a depth of between about 0.5 millimeters and about 1.5 millimeters.

4. A fuel cell stack (10) for generating electrical current, comprising:

- a. a plurality of thin fuel cells (46, 48, 50, 52, 54), wherein each thin fuel cell (46) includes
5 a water management water transport plate (60) that defines water management channels (62A, 62B, 62C, 62D) for directing flow of water from and through the thin fuel cell (46);
- b. a plurality of thick fuel cells (56, 58)
10 cooperatively disposed with the thin fuel cells (46, 48, 50, 52, 54) to form the fuel cell stack (10), wherein each thick fuel cell (58) includes a combined water management and coolant water transport plate (74) that defines
15 cooling channels (76A, 76B, 76C, 76D) for directing flow of water from and through the thick fuel cell (58); and,
- c. wherein the thick fuel cells (56, 58) are secured within the fuel cell stack (10) so that
20 at least one thin fuel cell (48, 50, 52, 54) is secured adjacent each thick fuel cell (56, 58),

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and wherein the water management channels (62A, 62B, 62C, 62D) have a depth parallel to a longitudinal axis of the stack extending a shortest distance between non-adjacent fuel cells (46, 48) of the stack (10) that is at least four times less than a depth of the cooling channels (76A, 76B, 76C, 76D).